



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,356	03/24/2006	Masato Shimada	Q93861	2179
72875	7590	08/25/2008	EXAMINER	
SUGHRUE MION, PLLC			GARCIA JR, RENE	
2100 Pennsylvania Avenue, N.W.				
Washington, DC 20037			ART UNIT	PAPER NUMBER
			2853	
			NOTIFICATION DATE	DELIVERY MODE
			08/25/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@sughrue.com
kghyndman@sughrue.com
USPatDocketing@sughrue.com

Office Action Summary	Application No.	Applicant(s)	
	10/573,356	SHIMADA ET AL.	
	Examiner	Art Unit	
	RENE GARCIA JR	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-61 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) Claim(s) ____ is/are allowed.
- 6) Claim(s) 1-6,12,13,15,16,20,21,30-32,34-38,44,45,47 and 48 is/are rejected.
- 7) Claim(s) 7-11,14,17-19,22-29,33,39-43,46 and 49-61 is/are objected to.
- 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 24 March 2006 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. ____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. ____ .
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>03/24/06; 06/01/06</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: ____ .

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted on 06/01/2006 and 03/24/2006 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

3. The abstract of the disclosure is objected to because it contains reference numbers and is not a single paragraph. Correction is required. See MPEP § 608.01(b).

Claim Objections

4. Claim 12 recites the limitation "the connection portions" in line 5. There is insufficient antecedent basis for this limitation in the claim. Claims 17, 18, 21 provide the same limitation, correction is required.

5. Claim 11 recites the limitation "connection wiring" in line 6. There is insufficient antecedent basis for this limitation in the claim. Claims 17, 19 provide the same limitation, correction is required.

6. Claim 11 recites "the lower electrode", should be "the lower-electrode lead electrode".

Double Patenting

7. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or

discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

8. Applicant is advised that should claim 30 be found allowable, claims 34, 35, 36, 37, 38, 44, 45, 47, 48 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 2, 3, 5, 6, 12, 30, 31, 34-38, 44, 45, 47, 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 2002/0080213) in view of Sato et al. (US 6,845,920).

Shimada et al. discloses the following claim limitations:

*regarding claims 1, 31, liquid-jet head characterized by comprising: (fig. 1, 2b;
ABS; ¶0002, 0144)

*channel substrate/flow passage formation substrate, 10/ which has pressure
generation chambers/12/ formed therein and communicating nozzle orifices/nozzle
openings, 11/ for discharging liquid droplets (¶0147, 0150-0152)

*piezoelectric elements/300/ (¶0156, 0157) each of which is composed of a lower
electrode/60/, a piezoelectric layer/70/, and an upper electrode/80/ and which are
disposed on one surface of the channel substrate/11/ via a vibration plate/elastic film,
50/

*wherein at least pattern regions of the respective layers which constitute the
piezoelectric elements/300/ are covered with an insulating film/90/ (¶0171)

*regarding claim 6, sum of stress of the insulating film and stress of the upper
electrode is compressive (¶0157)

*regarding claim 12, upper-electrode lead electrode/100/ extending from the
upper electrode/80/, wherein at least pattern regions of the respective layers which
constitute the piezoelectric elements/300/ and the upper-electrode lead electrode/100/
are covered with the insulating film/80/, except for regions facing connection portions of
the lower electrode and the upper-electrode lead electrode/100/, the connection
portions being used for connection with connection wiring (¶0171; fig. 1, 2b)

*regarding claim 30, liquid-jet apparatus characterized by comprising the liquid-jet head according to any one of claims 1 to 29 (¶0002); Applies to claims 2-6, 12, 13, 15, 16, 20, 21; Claim 34, 35, 36, 37, 38, 44, 45, 47, 48 are rejected based on rejection of those respective claims dependency below (for example claim 34 is dependent from claim 2, which is covered by same limitations of claim 30, thus applies).

Shimada et al. does not disclose the following claimed limitations:

*regarding claim 1, insulating film is formed of an inorganic amorphous material

*regarding claim 2, amorphous material is aluminum oxide (Al_2O_3)

*regarding claim 3, insulating film has a thickness of 30 to 150 nm

*regarding claim 5, insulating film has a Young's modulus of elasticity of 170 to 200 GPa

Sato et al. teaches the following:

*regarding claim 1, insulating film is formed of an inorganic amorphous material (fig. 1; col. 5, lines 7-12; col. 1, lines 8-10, 29-32, 38-42; col. 2, lines 13-17) for the purpose of blocking moisture to the piezoelectric element

*regarding claim 2, amorphous material is aluminum oxide (Al_2O_3) (col. 5, lines 7-12) for the purpose of maintaining and preventing the breakdown of layer and provide stable piezoelectric element

*regarding claim 3, insulating film has a thickness of 30 to 150 nm (col. 8, lines 34-39; col. 4, lines 1, 2, 19-25) for the purpose of maintaining and preventing the breakdown of layer and provide stable piezoelectric element

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize an insulating film is formed of an inorganic amorphous material; amorphous material is aluminum oxide (Al_2O_3); insulating film has a thickness of 30 to 150 nm as taught by Sato et al. into Shimada et al. for the purpose of blocking moisture to the piezoelectric element and maintaining and preventing the breakdown of layer and provide stable piezoelectric element

Shimada et al. as modified by Sato et al. discloses the claimed invention except for insulating film has a Young's modulus of elasticity of 170 to 200 GPa. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a Young's modulus of elasticity of 170 to 200 GPa, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. **In re Aller, 105 USPQ 233 (C.C.P.A. 1955).**

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 2002/0080213) as modified by Sato et al. (US 6,845,920) as applied to claim 2 above, and further in view of Ohashi (US 5,594,482).

Shimada et al. as modified by Sato et al. discloses all the claimed limitations except for the following:

*regarding claim 4, insulating film has a film density of 3.08 to 3.25 g/cm³

Ohashi teaches the following:

*regarding claim 4, insulating film has a film density of 3.08 to 3.25 g/cm³ (ABS; col. 1, lines 8-11; col. 3, lines 30-34, 54-67) for the purpose of maintaining and preventing the breakdown of layer and provide stable piezoelectric element

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize an insulating film has a film density of 3.08 to 3.25 g/cm³ as taught by Ohashi into Shimada et al. as modified by Sato et al. for the purpose of maintaining and preventing the breakdown of layer and provide stable piezoelectric element

12. Claims 13, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 2002/0080213) as modified by Sato et al. (US 6,845,920) as applied to claim 12 above, and further in view of Hashizume (JP 11-157073).

Shimada et al. as modified by Sato et al. discloses all the claimed limitations except for the following:

*regarding claim 13, upper-electrode lead electrode is formed of a material containing aluminum as a predominant component

*regarding claim 15, upper electrode and the upper-electrode lead electrode are formed of different materials

Hashizume teaches the following:

*regarding claim 13, upper-electrode lead electrode is formed of a material containing aluminum as a predominant component (fig. 4h; ¶0043) for the purpose of providing a material which prevents corrosion due to moisture and chemical properties of ink

*regarding claim 15, upper electrode and the upper-electrode lead electrode are formed of different materials (¶0043, 0024) for the purpose of providing a material which prevents corrosion due to moisture and chemical properties of ink

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize an upper-electrode lead electrode is formed of a material containing aluminum as a predominant component; upper electrode and the upper-electrode lead electrode are formed of different materials as taught by Hashizume into Shimada et al. as modified by Sato et al. for the purpose of providing a material which prevents corrosion due to moisture and chemical properties of ink

13. Claims 16, 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 2002/0080213) as modified by Sato et al. (US 6,845,920) as applied to claim 12 above, and further in view Shimada et al. (US 6,502,928).

Shimada et al. as modified by Sato et al. discloses all the claimed limitations except for the following:

*regarding claims 16, 20, piezoelectric layer and the upper electrode of each piezoelectric element extend to the outside of a region facing the corresponding pressure generation chamber so that a piezoelectric non-active portion is formed, and an end portion of the upper-electrode lead electrode on the side toward the upper electrode is located on the piezoelectric non-active portion and outside the pressure generation chamber

Shimada et al. teaches the following:

*regarding claims 16, 20, piezoelectric layer and the upper electrode of each piezoelectric element extend to the outside of a region facing the corresponding pressure generation chamber so that a piezoelectric non-active portion is formed, and an end portion of the upper-electrode lead electrode on the side toward the upper electrode is located on the piezoelectric non-active portion and outside the pressure generation chamber (fig. 9, 10, 16B; ABS; col. 16, line 63 - col. 17, line 26; col. 18, line 62 - col. 19, line 29)

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize piezoelectric layer and the upper electrode of each piezoelectric element extend to the outside of a region facing the corresponding

pressure generation chamber so that a piezoelectric non-active portion is formed, and an end portion of the upper-electrode lead electrode on the side toward the upper electrode is located on the piezoelectric non-active portion and outside the pressure generation chamber as taught by Shimada et al. into Shimada et al. as modified by Sato et al. for the purpose of locating wiring further on substrate to prevent shorting

14. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 2002/0080213) as modified by Sato et al. (US 6,845,920) as applied to claim 12 above, and further in view Usui et al. (US 6,033,058).

Shimada et al. as modified by Sato et al. discloses all the claimed limitations except for the following:

*regarding claim 21, protective plate having a piezoelectric-element-holding portion, which is a space for protecting the piezoelectric elements, is bonded to a surface of the channel substrate, the surface being located on the side toward the piezoelectric elements, and the connection portion of the upper-electrode lead electrode is provided outside the piezoelectric-element-holding portion

Usui et al. teaches the following:

*regarding claim 21, protective plate having a piezoelectric-element-holding portion, which is a space for protecting the piezoelectric elements, is bonded to a surface of the channel substrate, the surface being located on the side toward the piezoelectric elements, and the connection portion of the upper-electrode lead electrode is provided outside the piezoelectric-element-holding portion (fig. 13, 14; ABS; col. 7, lines 25-37)

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a protective plate having a piezoelectric-element-holding portion, which is a space for protecting the piezoelectric elements, is bonded to a surface of the channel substrate, the surface being located on the side toward the piezoelectric elements, and the connection portion of the upper-electrode lead electrode is provided outside the piezoelectric-element-holding portion as taught by Usui et al. into Shimada et al. as modified by Sato et al. for the purpose of sealing the piezoelectric element from the external environment

15. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 2002/0080213) as modified by Sato et al. (US 6,845,920) as applied to claim 31 above, and further in view of Nishiwaki et al. (US 6,147,438).

Shimada et al. as modified by Sato et al. discloses all the claimed limitations except for the following:

*regarding claim 32, step of patterning the insulating film, a portion of the insulating film within a predetermined region is removed by means of ion milling

Nishiwaki et al. teaches the following:

*regarding claim 32, step of patterning the insulating film, a portion of the insulating film within a predetermined region is removed by means of ion milling (col. 10, lines 49-51; ABS; col. 10, lines 24-32)

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a step of patterning the insulating film, a portion of the insulating film within a predetermined region is removed by means of ion milling as taught by Nishiwaki et al. into Shimada et al. as modified by Sato et al. for the purpose of forming an piezoelectric element with a protective film

Allowable Subject Matter

16. Claims 7-11,14,17-19,22-29,33,39-43,46 and 49-61 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter:

18. The primary reason for indicating allowable subject matter of claims 7, 8, 39, 40 is the inclusion of the limitation of a liquid-jet head including stress of the insulating film and stress of the upper electrode are each compressive. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

19. The primary reason for indicating allowable subject matter of claims 9, 10, 11, 41, 42, 43 is the inclusion of the limitation of a liquid-jet head including stress of the insulating film is compressive, and stress of the upper electrode is tensile. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

20. The primary reason for indicating allowable subject matter of claims 14, 46 is the inclusion of the limitation of a liquid-jet head including lower-electrode lead electrode extending from the lower electrode, wherein the lower electrode is connected to the connection wiring via the lower-electrode lead electrode, *and the pattern region containing the lower-electrode lead electrode is covered with the insulating film, except for regions of the upper-electrode lead electrode and the lower-electrode lead electrode facing the connection wiring.* It is these limitations found in each of the claims, as it is

claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

21. The primary reason for indicating allowable subject matter of claims 17, 49 is the inclusion of the limitation of a liquid-jet head including state in which the connection wiring is connected, the connection portions are covered with a sealing material formed of an organic insulating material. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

22. The primary reason for indicating allowable subject matter of claims 18, 50 is the inclusion of the limitation of a liquid-jet head including *insulating film includes a first insulating film and a second insulating film*, the piezoelectric elements are covered by the first insulating film except for the connection portion for connection with the upper-electrode lead electrode, the upper-electrode lead electrode is provided on the first insulating film, and at least the pattern regions of the respective layers which constitute the piezoelectric elements *and the upper-electrode lead electrode are covered with the second insulating film except for regions facing the connection portions*. It is these limitations found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

23. The primary reason for indicating allowable subject matter of claims 19, 51 is the inclusion of the limitation of a liquid-jet head including connection wiring includes a second upper-electrode lead electrode extending from the upper-electrode lead

electrode, the second upper-electrode lead electrode is provided on the insulating film and is connected to the upper-electrode lead electrode at the connection portion, and a terminal portion to which drive wring is connected is provided at a tip end portion of the second upper-electrode lead electrode. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

24. The primary reason for indicating allowable subject matter of claims 22-29, 54-61 is the inclusion of the limitation of a liquid-jet head including a protective plate having a piezoelectric-element-holding portion, which is a space for protecting the piezoelectric elements, is bonded to a surface of the channel substrate via an adhesive layer, the *surface being located on the side toward the piezoelectric elements, the protective plate includes a flow passage for liquid to be supplied to the pressure generation chambers, the adhesive layer located on the flow passage side of the piezoelectric-element-holding portion is exposed to the interior of the flow passage, and a moisture permeable portion which enables permeation of water within the piezoelectric-element-holding portion is provided in a region other than the flow passage side of the piezoelectric-element-holding portion.* It is these limitations found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

25. The primary reason for indicating allowable subject matter of claim 33 is the inclusion of the method steps of manufacturing a liquid-jet head that includes after the step of patterning the insulating film, a step of bonding a protective plate to a surface of

the channel substrate, the surface facing the piezoelectric elements, *the protective plate including a piezoelectric-element-holding portion for protecting the piezoelectric elements and a flow passage for liquid to be supplied to the pressure generation chambers*, wherein in the step of bonding the protective plate, an adhesive is applied to the protective plate such that a space portion is left in a portion of a region surrounding the piezoelectric-element-holding portion, except for a region located on the side toward the flow passage, the protective plate is bonded to the channel substrate, and the space portion is sealed by a material having a water permeability higher than that of the adhesive so as to form a moisture permeable portion through which water within the piezoelectric-element-holding portion permeates. It is these steps found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ohashi EP 0612619 teaches the use of inorganic film to protect electrodes and the film density to achieve such function. Higuci et al. (US 2003/0132991), Koo et al. (US 7,348,593), Shimada et al. (US 7,101,026) teach piezoelectric actuators, specifically the materials composing the electrodes. Takahasi (US 7,364,273; 2006/0209136; 2006/0098058; 7,239,070) teach similar structures related to piezoelectric elements utilized in ink jet technology.

Communication with the USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RENE GARCIA JR whose telephone number is (571)272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. G./
Examiner, Art Unit 2853

/STEPHEN D. MEIER/
Supervisory Patent Examiner, Art Unit 2853